

Dust Mitigation for the Lunar Surface, Phase II

Completed Technology Project (2010 - 2012)



Project Introduction

The lunar surface is, to a large extent, covered with a dust layer several meters thick. Known as lunar regolith, it has been produced by meteorite impacts since the formation of a solid lunar surface billions of years ago. The regolith, while promising as a future building material for lunar installations, also poses a hazard in the form of dust clouds being generated by all forms of gas expansions in the high vacuum environment of the lunar surface. This is especially pronounced during spacecraft operations; a single lunar landing and take-off emits the same amount of gas as the whole lunar atmosphere contains. Instruments placed on the moon by the Apollo mission showed marked degradation due to damage from dust released during the lander's takeoff. Since there is no air movement to remove the dust after it is deposited, it is essential that dust is not displaced during everyday operations of a permanent lunar installation. Adherent Technologies, Inc. (ATI) has over the last decade developed a number of specialty UV-curing resins for NASA applications in space. In the Phase I program, ATI developed a resin and dispenser system to coat large areas of lunar surface around landing pads and atmosphere locks with a thin, dust-stabilizing coating. The coating is UV stable and elastic enough to weather the temperature extremes of a lunar day and night cycle. Special emphasis was given to a low outgassing, solvent-free system that does not contaminate the lunar atmosphere. In the Phase II program, ATI will optimize the resin formulations from the Phase I for thin film coatings. By comparing those to two-part resin systems, a balance between required properties and needed launch weight can be struck for different mission profiles. The engineering development will concentrate on a lightweight, reliable spray system to be added onto existing NASA moon vehicles.



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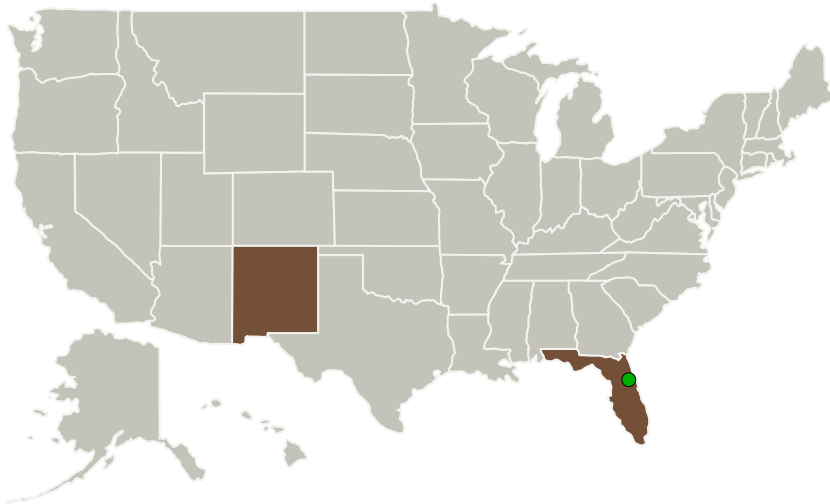
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Adherent Technologies, Inc.	Lead Organization	Industry	Albuquerque, New Mexico
● Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations

Florida	New Mexico
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Project Transitions

January 2010: Project Start

March 2012: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138947>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Adherent Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

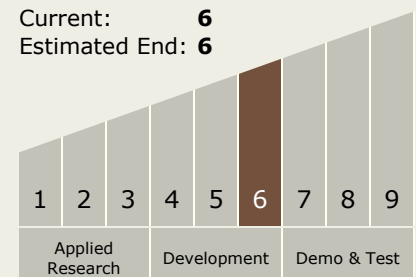
Carlos Torrez

Principal Investigator:

Jan M Gosau

Technology Maturity (TRL)

Start: 6
Current: 6
Estimated End: 6



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
 - └ TX07.2.5 Particulate Contamination Prevention and Mitigation

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System